

THE HONORABLE THOMAS S. ZILLY

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

AIRBIQUITY INC.,
a Washington corporation,

Plaintiff,

v.

AT&T MOBILITY LLC, *a Delaware limited liability*
company; NEW CINGULAR WIRELESS
SERVICES, INC., *a Delaware corporation*; and
NEW CINGULAR WIRELESS PCS LLC, *a*
Delaware limited liability company,

Defendants.

CIVIL ACTION No. 2:08-cv-00094-TSZ

**DECLARATION OF MARK S.
CARLSON IN SUPPORT OF
PLAINTIFF'S SUPPLEMENTAL
SUMMARY JUDGMENT BRIEF IN
TO DISMISS DEFENDANTS'
AFFIRMATIVE DEFENSE OF
GOVERNMENTAL IMMUNITY
UNDER 28 U.S.C. § 1498(a)**

I, Mark S. Carlson, declare as follows:

1. I am an attorney with Dorsey & Whitney, LLP, which represents the plaintiff in the above-captioned case. I am over the age of eighteen years, and I make the following declaration based upon my personal knowledge.

2. In support of their Supplemental Response to Plaintiffs' Motion for Partial Summary Judgment to Dismiss, defendants filed the Declaration of Jeffery D. Baxter (Dkt. No. 124), with over five-hundred pages of exhibits, consisting of sixteen documents. In addition, they cite to eight documents ,

most of which are over a hundred pages in length, filed as exhibits to the Declaration of Travis Thomas (Dkt. No. 68), which was filed on November 18, 2008 in support of defendants' initial opposition. Although each set of declaration exhibits is voluminous, defendants cite to only a few pages in each document, and only a few sentences or paragraphs on each cited page.

3. I submit this declaration to assist the Court and the Court's clerk in the review of these voluminous papers, by attaching only the pages that were actually cited by defendants in their supplemental memorandum. Following is a bullet point-by-bullet point review of the evidence that defendants cite to support these propositions at pages 4-8 of their Supplemental Response:

- TTY Forum – 1, September 17-19, 1997 (Baxter Ex. B). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit A. Defendants cite repeatedly to the comments of FCC representative Won Kim, who concluded that the FCC “will remain actively involved to ensure resolution of implementation issues.” Baxter Ex. B at INV0000008. They fail to mention that this comment appears under the heading “Reporting Requirements,” followed by comments on the industry participants' duty to make periodic status reports to the FCC. *Id.* They also fail to acknowledge the preceding statements of the FCC's position on whether it should play any role in determining what technology should be adopted by the industry. The FCC stated that it would “not attempt to establish extensive technical standards for E9-1-1 operation, noting that industry standards-setting committees should address precise technical requirements for E9-1-1 compatibility.” INV0000007. The FCC would provide “general performance criteria for wireless E9-1-1 service, rather than precise technical standards for the industry.” *Id.* The only other page cited by defendants is Won Kim's biography (INV00000020), which was attached at the end of the meeting report.
- TTY Forum – 4, April 1-2, 1998 (Baxter Ex. C). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit B.

Defendants cite to page INV00000073, in which the FCC representative reported that he had

no updates to report, and page INV0000081, which is the attendance sheet for the meeting. They cite also to a technical discussion on pages INV0000075-76, but the minutes do not reflect any participation by the FCC representative in that discussion.

- TTY Forum – 5, May 20-21, 1998 (Baxter Ex. D). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit C. Defendants cite to page INV0000106, which is the attendance sheet for the meeting, showing that an FCC representative attended. They cite also to a technical discussion at pages INV0000097-102, but the minutes do not reflect any participation by the FCC representatives in that discussion.
- TTY Forum – 6, July 21-22, 1998 (Baxter Ex. E). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit D. Defendants cite to pages INVINV0000127-28, which is the attendance sheet for the meeting. They cite also to a request that the industry clarify its proposal to the FCC for partial compliance with the § 20.18(c). INV0000123. There is no discussion of any particular technology to be employed to achieve compliance. *Id.*
- TTY Forum – 7, September 8-9, 1998 (Baxter Ex. F). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit E. Defendants cite to page INV0000162, which is the attendance sheet for the meeting, showing an FCC representative was present. They cite also to a technical discussion at pages INV0000144-49, but the minutes do not reflect any participation by the FCC representatives in that discussion.
- TTY Forum – 8, October 7-8, 1998 (Baxter Ex. G). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit F. Defendants cite to page INV0000180-83, in which the FCC representative in attendance expressed frustration with the slow pace of progress at the TTY Forum (INV0000180), suggested that consumers might desire to participate in testing of any TTY solution

(INV0000181), and stated what criteria the FCC would like to see for any testing program developed by the industry (INV0000182). The FCC representative did not tell the industry representatives what tests to perform, or how to perform them. *Id.*

- TTY Forum – 9, November 4-5, 1998 (Baxter Ex. H). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit G. Defendants cite to the attendance sheet (INV0000208), showing that an FCC representative was present. They cite also to a technical discussion (INV0000201-206), but the minutes do not reflect any participation by the FCC representatives in that discussion.

- TTY Forum – 10, January 26-27, 1999 (Baxter Ex. I). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit H. Defendants cite to INV0006410, in which the FCC representative acknowledged receipt of over 100 requests for waivers of the deadline to comply with the FCC's TTY mandate. They cite INV0006422, the meeting's attendance sheet. They cite to a technical discussion at pages INV0006414-6420, but the only contribution by an FCC representative to the discussion was an expression of feelings of encouragement over the industry's progress towards compliance at page INV0006419.

- TTY Forum -11, May 18, 1999 (Baxter Ex. J). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit I. Defendants cite to page INV0006444, in which the FCC representative expressed that he was looking forward to hearing the industry's progress in testing. They cite also to pages INV0006451-52, the attendance sheet for the meeting. They cite a discussion of technical test results (INV0006445-6447), but the minutes reflect no contribution by any FCC representative to this discussion.

- TTY Forum – 12, September 9, 1999 (Baxter Ex. K). True and correct copies of all pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit J.

Defendants cite to page INV0006476, in which the FCC representative expressed that he

1 was looking forward to the beginning of implementation of solutions by the industry, and
 2 page INV0006479, in which he expressed his pleasure at seeing the industry's progress,
 3 and requested a timetable for implementation.. They cite to pages INV0006481-84, in
 4 which a discussion of testing appears, but the only contribution by an FCC representative
 5 was two questions. Finally, they cite to page INV0006490, the meeting's attendance sheet.

- 6 • TTY Forum – 13, November 18, 1999 (Baxter Ex. L). True and correct copies of all pages
 7 that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit K.

8 Defendants cite to pages INV0006514, in which the FCC representatives had no updates to
 9 report, and that a status update had been submitted to the FCC, and they cite to the
 10 meeting's attendance sheet, at INV0006523. They cite to a technical discussion at pages
 11 INV0006516-20, but the minutes do not reflect any contribution by an FCC representative.

- 12 • TTY Forum – 14, April 5, 2000 (Baxter Ex. M). True and correct copies of all pages that
 13 AT&T cites in its Supplemental Response brief are attached hereto as Exhibit L.

14 Defendants cite to page INV0006549, in which the FCC representative stated that the FCC
 15 would seek comments from consumers, manufacturers and wireless carriers concerning
 16 TTY. They cite to a statement by the Chair of GSM TIP1.5, the international GSM
 17 standards setting body, that his group had decided to adopt the Ericsson proposed solution
 18 for compliance with § 20.18(c), at page INV 0006550. He does not say that the FCC
 19 played any role in the group's choice of the Ericsson solution.

- 20 • TTY Forum – 15, July 11, 2000 (Baxter Ex. N). True and correct copies of all pages that
 21 AT&T cites in its Supplemental Response brief are attached hereto as Exhibit M.

22 Defendants cite to the FCC representative's description of the FCC's public notice for
 23 comment, the availability of received comments, and need for information sharing to
 24 achieve timely compliance, at INV0006589-91. They also cite to a technical discussion at
 25 INV0006594-95, but the minutes reflect no contribution by the FCC representative.

- 1 • TTY Forum – 16, November 9, 2000 (Baxter Ex. O). True and correct copies of all pages

2 that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit N.

3 Defendants cite to pages INV0006690, in which the FCC representative stated he had no

4 report, 6691, in which another non-technical comment appears, 6696, in which the FCC

5 representative urges the industry to work together to develop unspecified standards for

6 compliance, and 6699, the meeting's attendance sheet. Defendants emphasize Ericsson's

7 presentation at the meeting (INV0006693, but the minutes reflect no contribution by any

8 FCC representative.
- 9 • TTY Forum – 17, March 14, 2001 (Thomas Ex. M). True and correct copies of all pages

10 that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit O.

11 Defendants cite to page 5, in which the FCC representative explained the departure of a

12 former representative and introduced her replacement, who commented on the deadline for

13 compliance and the requirement of quarterly compliance status reports. They cite page 10,

14 in which an FCC representative explained that The FCC "has left to the market to decide

15 which is the best solution," that the regulations "have not provided specifics," and that

16 enforcement had been "compliant driven." They also cite pages 16-17, the attendance

17 sheet. The minutes reflect no technical contribution by an FCC representative.
- 18 • TTY Forum – 18, June 12, 2001 (Thomas Ex. N). True and correct copies of all pages that

19 AT&T cites in its Supplemental Response brief are attached hereto as Exhibit P.

20 Defendants cite page 5, in which the FCC representative thanked the Forum for filing

21 compliance status reports, and pages 13-14, the meeting attendance sheets. They cite

22 technical status reports by industry participants at pages 5-8, but the minutes reflect no

23 contribution by an FCC representative.
- 24 • TTY Forum – 19, September 26, 2001 (Thomas Ex. O). True and correct copies of all

25 pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit Q.

26 Defendants cite page 5, in which the FCC representative thanked the Forum for filing

1 compliance status reports, and page 12, the meeting attendance sheet. They cite to a
 2 technical discussion on page 6, but the minutes reflect no contribution by an FCC
 3 representative.

- 4 • TTY Forum – 20, December 11, 2001 (Thomas Ex. P). True and correct copies of all
 5 pages that AT&T cites in its Supplemental Response brief are attached hereto as Exhibit R.
 6 Defendants cite page 5, in which the FCC representative thanked the Forum for filing
 7 compliance status reports, and page 13, the meeting attendance sheet. They cite to a
 8 technical discussion at pages 6-7, but the minutes reflect no contribution by an FCC
 9 representative.
- 10 • TTY Forum – 21, March 5, 2002 (Thomas Ex. Q). True and correct copies of all pages that
 11 AT&T cites in its Supplemental Response brief are attached hereto as Exhibit S.
 12 Defendants cite page 6, in which the FCC representative expressed her interest in hearing
 13 the industry's progress towards compliance, and her hope that the deadline for compliance
 14 would be met. They also cite the meeting's attendance sheet, at page 13. The cite to a
 15 technical discussion at page 7, but the minutes reflect no contribution by an FCC
 16 representative.
- 17 • TTY Forum – 22, June 4, 2002 (Thomas Ex. R). True and correct copies of all pages that
 18 AT&T cites in its Supplemental Response brief are attached hereto as Exhibit T.
 19 Defendants cite to pages 6-7, in which FCC representatives underscored the importance of
 20 the impending deadline for compliance, and page 13, the meeting's attendance sheet. They
 21 cite a technical discussion at page 10, but the minutes reflect no contribution by any FCC
 22 representative.

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1 I declare under penalty of perjury that the foregoing is true and correct.

2 Signed in Seattle, Washington, this 22nd day of May, 2009.

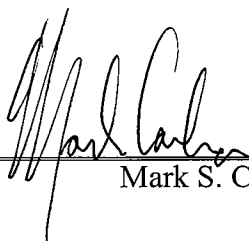
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8 Mark S. Carlson
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Exhibit A



CTIA Forum

**Seeking Solutions to TTY/TDD Through
Wireless Digital Systems**

Report

VERSION 1.0
(October 20, 1997)

September 17-19, 1997
Arlington, Virginia

CTIA TTY/TDD FORUM - 1 REPORT

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| John Melcher, Emergency Service Perspective On TTY Service, Director, MIS, Greater Harris County 9-1-1 | 9 |
| Pam Holmes, Consumer Perspective On TTY Services, Director, Ultratec | 10 |
| Karen Peltz Strauss, Consumer Perspective on TTY Services, Legal Counsel, National Association of the Deaf | 11 |
| Billy Ragsdale, PSAP Connectivity Overview, Bell South, NENA | 12 |
| Toni Dunne, Relay Service Overview, Texas 9-1-1 Commission, Training and Access Program Manager | 12 |
| Ron Schultz, TTY Technology Overview, Vice President, Ultratec | 13 |
| Jeff Crollick, Wireless Technical Standards Overview, SCC Communications | 14 |
| Ed Hall, Wireless Systems Overview, Assistant Vice President, CTIA | 15 |
| Chris Wallace, Vocoder Technologies & Testing, "Codecs, An Overview", Nokia | 16 |
| Jeremy Pemble, Vocoder Technologies & Testing, PCS-TTY Compatibility", Manager, Government Affairs, Siemens Wireless Terminals | 17 |
| Christopher Kingdon, Vocoder Technologies & Testing, "Ericsson TDD/TTY GSM Compatibility Investigation, Ericsson | 18 |
| Dick Brandt, ITU Recommendation V.18, dB Consulting | 18 |
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This report may be purchased for \$75. Presentation materials included for \$95.

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CTIA TTY/TDD FORUM - 1 REPORT

OPENING REMARKS

Bob Montgomery, Director for Network Operations, CTIA

The CTIA focus for the forum is on concerns with E9-1-1 and the FCC Report and Order, with a highlight on the issues surrounding TTY.

By working with the 3 focus groups identified in the "Goal" section of the agenda, CTIA seeks consensus on how best to support TTY over digital wireless.

The identified participants: the wireless industry, subject matter experts, and consumer organizations, were charged with addressing the agenda in three phases - discovery, analysis, resolution phases. The outcome is to be a report to be published to the industry (consisting of the three groups) and will serve as a source of primary information for the report to the FCC due next month.

Three areas of issues and concerns: regulatory issues, technology issues and other issues, were to be captured for resolution. The ultimate goal is to provide TTY service in a digital air environment. A call for contributions sought all verbal and written input to facilitate discussion during the analysis phase.

PRESENTATIONS AND CONTRIBUTIONS

WON KIM, *Analysis Of FCC Report, FCC Perspective*, Policy Division, Wireless Bureau, FCC (refer to handout reprinted in this report)

The opening statements clearly identified that the FCC will not address questions regarding substantive issues that are pending a vote. The Commission's commitment to the statutory mandate to "promote safety of life and property through the use of wire and radio communication" causes them to view with concern the inability of digital wireless customers to benefit from the advances in emergency capabilities of E9-1-1 systems available to most wireline customers.

While the Commission declined to delay introduction of PCS broadband services, direction was issued to the industry to pay particular attention to E9-1-1 access. In the Emergency Access Position Paper (Joint Paper), an *Ex Parte* filing in the PCS proceeding by APCO, NENA, NASNA, and PCIA, consensus recommendations to assist standards bodies in developing standards for wireless systems to access E9-1-1 service systems were offered. The JEM Report, filed by APCO, NENA, NASNA, and PCIA further proposed wireless E9-1-1 features. These offerings formed, in part, the basis of the E9-1-1 NPRM (adopted 9/1/94). The proposed TTY compatibility requirement of the NPRM was that within one

CTIA TTY/TDD FORUM - 1 REPORT

year of the effective date of the order adopting rules in the proceeding, radio services must be capable of providing access by individuals with speech or hearing disabilities through a TTY device.

The E9-1-1 NPRM sought to improve 9-1-1 access for wireless service users and to establish an implementation schedule for enhanced 9-1-1 services. It did not attempt to establish extensive technical standards for E9-1-1 operation, noting that industry standards-setting committees should address precise technical requirements for E9-1-1 compatibility. A Consensus Agreement, representing negotiations between CTIA, for both PCS and Cellular carriers, and the Public Safety Community, represented by APCO, NENA, and NASNA, published consensus regarding various issues on the wireless E9-1-1 features. The Consensus Agreement agreed with the Commission's proposed requirement that 9-1-1 access be available through TTY devices and suggested that the industry should determine and establish standards to permit interface between TTYs and wireless systems.

In the Wireless E9-1-1 First Report and Order (adopted 6/12/96), the Commission committed to foster major improvements in the quality and reliability of wireless E9-1-1 service. Further, it established basic and enhanced requirements for wireless carriers (cellular, PCS, some SMRs), and provided general performance criteria for wireless E9-1-1 service, rather than precise technical standards for the industry.

Wireless E9-1-1 Rules: 47 C.F.R. &20.18 (*recon. pending*) identifies the requirement for availability of Basic 9-1-1, TTY access, Phase I Enhanced 9-1-1 capabilities (ANI), Phase II Enhanced 9-1-1 capabilities (ALI), and Reporting Requirements.

Action required by date:

- October 1, 1997 - Phase I
 - Carriers must process and transmit to an appropriate PSAP all 9-1-1 calls from wireless handsets which transmit a code identification, without user validation.
 - Carriers must process and transmit calls that do not transmit a code identification to any appropriate PSAP which has formally instructed the carrier that it wants to receive such calls from the carrier.
 - Carriers must also be capable of transmitting 9-1-1 calls made through the use of TTY equipment.
- April 1, 1998 - Phase II
 - Carriers must take actions necessary to relay a caller's Automatic Number Identification (ANI) and the location of the

CTIA TTY/TDD FORUM - 1 REPORT

cell site receiving a 9-1-1 call from any mobile handset or TTY device accessing their system to the PSAP.

- The PSAP can then call back the wireless phone which placed the 9-1-1 call, if disconnected, and help identify the location of the caller.
- October 1, 2001
 - Carriers are required to have the capability to identify the latitude and longitude of the mobile unit making a 9-1-1 call within a radius of no more than 125 meters using Root Mean Square measurement (including TTY calls).

Reporting Requirements

- The Commission will remain actively involved to ensure resolution of implementation issues.
- The Commission required the signatories to the Consensus Agreement, PCIA, and Alliance to provide the Commission with joint reports regarding the status of the resolution of the remaining implementation issues.
- By January 30, 1998, parties to the Consensus Agreement, PCIA and Alliance are required to file the first annual status report and operational standards necessary to implement wireless E9-1-1 features.
- The Commission concluded that parties and industry standard bodies should coordinate their efforts to resolve these technical issues before the end of 1996.

WENDY CHOW, Analysis Of FCC Report, CTIA Perspective, CTIA Legal Staff

There is a need to establish commitment and consensus in resolving the issue of providing TDD/TTY support through wireless digital systems. CTIA is committed to finding a solution in accordance with the law and the needs of the community. It is both good policy and good business. The industry has been working hard to meet the deliverables. Today we are looking to find solutions and meet reporting requirement. Efforts should not ignore analog advances. The FCC has directed specific solutions and required that all parties must address the issue together. The October 1, 1997 deadline to provide solution has met with various comments. The requested 18 month extension has been challenged and asked to reflect a 9 month only extension. With new commissioners coming in October, an education process would be involved if an extension were granted because the issue would then be handled by new commissioners who must learn about the history and concerns. The drive of this Forum is to establish a committed group made up of representatives from all identified interest groups. This group will provide a consensus report which will be supplied to the FCC and other parties in order to establish that on-going

CTIA TTY/TDD FORUM - 1 REPORT

BIOGRAPHIES

Bob Montgomery, Director for Network Operations, CTIA
BIOGRAPHY UNAVAILABLE

WON KIM

202-418-1368 (phone), 202-418-7247 (fax), E-mail:wkim@fcc.gov

Position:

Attorney Policy Division September 1995-Present
Wireless Telecommunications Bureau
Federal Communications Commission
[Working on the Wireless E9-1-1 Rulemaking Proceeding since September 1995]

Education:

Georgetown University Law Center, JD, *cum laude* May 1995
Washington, DC

University of Exeter, MA in English Literature November 1991
Exeter, England

Ewha Womens University, MA in English Literature August 1985
Seoul, Korea

Ewha Womans University, BA in English Literature February 1983
Seoul, Korea

WENDY CHOW

BIOGRAPHY UNAVAILABLE

JOHN MELCHER

BIOGRAPHY UNAVAILABLE

PAM YOUNG-HOLMES

Ultratec, Inc.
Director, Consumer & Regulatory Affairs
450 Science Drive
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Ms. Holmes, Director of Consumer and Regulatory Affairs, has been with Ultratec, Inc. since 1987. She graduated from Gallaudet University in

Exhibit B

TTY Forum

Seeking Solutions to TTY/TDD Through Wireless Digital Systems TTY/TDD FORUM - 4

Draft Report .02
(April 15, 1998)

**April 1 - 2, 1998
Gallaudet University
Washington, DC**

- Reached consensus on a uniform message to all consumers to alert them to not purchase a digital phone today to carry TTY signals.
- AT&T Wireless will have TTY message printed on all bills going out to customers. BellSouth also sending message in condensed form for inclusion on all bills to all customers.
- Exact wording of message was discussed and agreed to at the last meeting of the TTY forum.

Discussion:

- Ultratec will have a message that they have written for their Website- www.ultratec.com (specific discussion under EasyLink). Ultratec is linking with Gallaudet's web site and could link to CTIA's [wow.com](http://www.wow.com).
- Carriers have printed notice on bill, included inserts in package, made placard for sales offices to reach largest group possible.
- Article in next MD Relay newsletter containing full content of notification text.
- Letter sent from CTIA to consumer organizations containing full text and offering electronic text from CTIA website. Refer to Judy's article. Mailing list from Judy Harkins is in process of being mailed. PCIA will mail letter also.
- Gallaudet offered comments to improve Ultratec's notification wording and Ultratec will entertain these comments.

10. AGREEMENT STATEMENT RE: CARRIER AND MANUFACTURERS RESPONSIBILITY FOR 10/1/98 DEADLINE and DUAL-MODE HANDSETS

See discussion under Agenda Item #8.

11. WORKING GROUP REPORTS:

• WORKING GROUP #1/3

Summary: Group disappointment was expressed at the lack of progress and participation by the manufacturers in completing throughput testing. Consensus was reached to send a letter from the TTY Forum with CTIA/PCIA endorsement, urging strong support and effort to complete the testing. The FCC will be apprised of these efforts.

Wesley Howe, GTE Wireless, co-chair presented the Working Group #1/3 report. CDG is going to do throughput testing for CDMA. CDG group members have not heard of this effort. Alan Wolf, chair of subcommittee, is familiar with the issue. No contributions were received from other members of working group. Bell Atlantic is doing testing but does not have anything to report-they are seeing widely varied results. Lucent has begun preliminary testing and will have status report for the next meeting. Lucent is testing the vocoders. Sprint is testing - 110bps ASCII - error rates about 10%, 300bps showed unreasonable error rate. Gallaudet showed mixed results at previous TTY meeting. Motorola is doing testing - no results to report.

Discussion:

- Consensus of TTY Forum that manufacturers need to perform tests and report back results to next meetings. CTIA and PCIA must communicate with manufacturers the need for their support. Set up matrix of manufacturers and results which will be submitted to the FCC and included in TTY Forum report.
- Field testing is required as the second phase of the throughput test. Identify which manufacturers will supply equipment for Gallaudet to do field testing.
- Standards group has been unsuccessful in creating a wireless stress test for modems. Since these are similar issues there may be a problem achieving a test.

Doug Neeley, Ericsson, Interconnection Issues for Working Group #3:
 Concern is to provide retrofit to support TTY manufacturers equipment and to work with wireless manufacturers equipment. Upon polling manufacturers, agreed that the 2.5mm jack and short cable would retrofit phones and Ultratec. Voltage changes depending on handset. Identify voltage for TTY to look for. Audio levels are different for model to model, but with AGC circuitry in phone audio will work in the range available. For testing use a standard handset for acoustic coupling. Audex has built a retrofit for about \$80.

Build test to:

- 2.5 mm interface with short cable
- attach conventional handset to provide acoustic coupling
- TTY devices have acoustic coupling, jacks, or both so multiple solutions are required.
- Create a strawman that gives workable point of x dbm for manufacturers.
- TR45.1 analog standard could build standard for analog coupler
- Agreement from Ultratec to provide typical signal levels for both acoustic and RJ solutions. Problem providing standard 2.5 mm connection.

Consensus for Doug Neeley to put researched opinion on output voltages (coupling information) into a formal document and present to manufacturers. Give 30 days for feedback.

• REPORT OF WORKING GROUP #2

Brye Bonner, Motorola, chair,
 No report available.

12. DEFINE END USER TEST

Toni Dunn, Texas 9-1-1, chair. Presentation by Judy Harkins, Gallaudet University

--Add presentation--

ADD NOTE on slide for PROCEDURE - conversations are real so they are not necessarily logical.

Discussion:

- Remember that the deaf caller is vulnerable to error because they might type

ATTENDANCE

| NAME | COMPANY | PHONE | FAX | E-MAIL |
|----------------------|---------------------------|---------------------------------|--------------|--------------------------------|
| Baquis, David | SHHH | 301-657-2248 301-657-2249(t) | 301-913-9413 | dbaquis@shhh.org |
| Barclay, Deb | Lucent | 630-979-5660 | 630-713-6215 | d/barclay@lucent.com |
| Berger, Stephen | Siemens Business Comm Sys | 512-990-6417 | 512-990-6335 | stephen.berger@siemenscom.com |
| Brandt, Richard | Gallaudet University | 908-735-6171 | 215-790-3208 | Brandt@gallaudet.edu |
| Crollick, Jeff | SCC Communications | 813-985-3581 | 813-985-3582 | jeff_crollick@scc911.com |
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| El-Rayes, Mohamed | Nokia | 972-894-5872 | 972-894-4064 | mohamed.el-rayes@ntc.nokia.com |
| Hall, Lysie | Wallis & Assoc | 410-489-2808 | 410-489-2806 | lysie@erols.com |
| Harkins, Judy | Gallaudet University | 202-651-5257 | 202-651-5476 | jeharkins@gallaudet.edu |
| Holdahl, Ted | Sprint PCS | 913-664-8400 | 913-664-8440 | Holdahl@pcslab.com |
| Howe, Wesley | GTE Wireless | 770-391-1727 | 770-395-8505 | whowe@mobile.net.gte.com |
| Jackson, A.T. (Toni) | Lucent | 630-979-7867 | 630-224-3611 | Atjackson@lucent.com |
| Jeffries, Tim | CTIA | 202-736-3896 | 202-466-7239 | tjeffries@ctia.org |
| Kelly-Frey, Brenda | State of MD MD Relay | 410-767-5891 | | frey@dbm.state.md.us |
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| Madigan, Mary | PCIA | 703-739-0300 x3011 | 703-836-1608 | Madiganm@pcia.com |
| McClarren, Don | Philips Consumer Comm | 6732-878-8414 | 736-463-6863 | dmcclarren@lucent.com |

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| | | | | |
|-------------------------|--|-----------------------|--------------|---------------------------------|
| Melcher, John | Grt Harris Cty 9-1-1, NENA, APCO | 713-625-9911 | 713-864-9911 | Jmelcher@911. org |
| Moller, Paul | Motorola | 847-523-5210 | 847-523-8872 | paul- moller@css.mo t.com |
| Neeley, Doug | Ericsson | 972-583-0562 | 972-583-1809 | doug.neeley@e ricsson.com |
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Exhibit C

TTY Forum

Seeking Solutions to TTY/TDD Through Wireless Digital Systems TTY/TDD FORUM - 5

Draft Report .02
(June 10, 1998)

**May 20-21, 1998
Washington, DC**

Company presentation made by Josh Lober on cellular TTY compatible with the Motorola phone. Hearing carry-over with a headset plugged in to the TTY. Tested what would happen with tones through the vocoder. Believe that good TTY signals is possible through the vocoder currently. Problem is the quality of the TTY device itself. Currently less than 30% of TTYs are compatible with digital. Bring compatibility up to about 90% using specialized DSPs. Tests are all done at 45.5 baud (BAUDOT). Goal is 3 bit errors. NO success in CDMA yet. Only format tested so far is IS 136. Trying to solve for this problem and believe other technologies. Remember that in IS136 1 bit is approximately equal to 1 frame (so there are 8 opportunities to wipe out a letter). Ericsson showed acceptable error rate for GSM and IS136. Channel coding - once phone is connected to TTY all features run through the phone. Would like to work with more phone manufacturers. Testing has been a problem because there are no digital voice channels to run testing in Central California. Do not have a 2.5 mm jack as yet, has RJ11, RJ45, and headphone jack for VCO/HCO. Ultratec is largest provider and has a widely varied quality of receivers. Some are performing beyond the requirements of digital and some are not. They are designed for landline performance. Disagree with the change of tone as a solution. Believe solution is in the improvement of the transmission itself. Testing is done in a lab, in a closed loop environment, Base station designed by Lober, at high tolerance. All static testing, some drive testing, forward traffic messaging (hand-offs etc) seems to be OK. Ericsson has seen loss of one character during a handoff in their testing. Tests used are alphanumeric but Lober is open to any testing method. Currently compatible phones are all Motorola flip phones. Customers can buy product directly from Lober under Lober & Walsh Engineering, Cellular Product Technologies, Inc. Web-site is) www.cellulartty.com Goal of Lober and Walsh is to join next meeting (July) with a demonstration of TTY over digital.

- ERICSSON presentation

Presenting quickest way to solve for present TTYs and will be acoustic handset coupling for short-term. This approach has been successfully tested for users and will be completed before Oct. 1 and available for all Ericsson handsets. The medium term solution will be a direct electrical connection. Presented at TR45, with direct acoustic coupling, the standardized solution would offer opportunity for all phones to be compatible through standards process. Long-term solution would be a direct coupling to the TTY. Understanding the most appropriate process through the TTY Forum will help with solution. Ericsson will work with operators and will work through Gallaudet and assist AT&T Wireless for a solution. Error rate is 1% with GSM and 6% with IS 136 for short-term solution. Transmission through TTY and wireless network will eventually run digital but will have to convert back to analog for POTS transmission.

There is a standardized connector for DCE-DTE approved a year ago in TIA TR30.2 (see contact Dick Brandt for information). Ericsson is taking consumer comments into consideration. Voice-through will be part of intermediary solution and should be standardized by a standards body.

- Sendele Wireless Solutions Inc.
Company presentation made by Steve Sendele on AxCell interface device - Steve Sendele discussed Axcel wireless interface. Topic of conversation is how the TTY device connects to the phones. List of compatible phones is available. Mission of the company is to become dominant supplier... All phones are analog except DT2000 (digital)
Why does air interface technology matter to the data interface? The interface device only reads the handset.
Answer: the buss structure changes.
- Analog Phone / TTY Devices List
CTIA is in process of gathering a manufacturer list and has run into a problem with proprietary disclosure with some manufacturers.
Questionnaire asked specific questions but will be changed to ask a simple compatibility question to complete list as quickly as possible.

12. WORKING GROUP REPORTS

• WORKING GROUP #1/3

Wesley Howe, chair

Ahmed Tarraf, CDMA testing – system test had limitations which will be discussed.

Conclusion of test results is that CDMA can be transmitted through the vocoder successfully.

TTY modems produce a signal level 7db higher

Frame error rate is dominant factor in the Character Error Rate (i.e. 1% Frame Error Rate is almost 9% Character Error Rate)

Normal operation would translate to 8-16% Character Error Rate depending on the carrier. In the lab the vocoder can pass the signal at 0% error rate.

The vocoder is not the problem. There is error correction for data but not for voice. The difference between connector S (i.e. direct electrical connection vs. a handset acoustical) is a factor that introduces error – the direct electrical connection introduces minimal error. For initial testing, coupling will be a minimal issue if it does not introduce error. For the end product, the coupler will be important. Stop bits range from 1.0-2.0 the ration error might change depending on the stop bit. Modem produced 2.0 stop bit error consistently. Short term solution is to maintain FER as close to 0% SO TRANSMIT more power on the reverse link to achieve 0% FER. Must keep vocoder at full rate at all times. Phone should be at full rate at all times during TTY transmission. Short-term solution is to create a small

firmware change in the power control in the model. Then send bad frame bits to trick system into sending at full power.

NOKIA, Muhammed El-Rayes

Possible causes for error:

- Coupling
- DSP Baseband functions
- Vocoder Parameters
- Link Conditions
- Network Factors

AMPS Measurements show error rate less than 1%.

PCS 1900 shows error rate about 2-4%.

TDMA shows error rate of greater than 10%

CDMA show error rate of less than 10%

CDMA can work in time for Oct 1 but if the EVRC proliferates throughout the networks then CDMA will be unacceptable. The solution is to ask service providers to fix the rate at 13Kbps. Comments indicate that the EVRC issue is fixed.

Conclusions: The vocoder rate is likely the major effect on error rate. A direct connection is more robust. Possible future solutions:

- ITU-T V.18
- TR45.3 (TDMA): US1 Vocoder (12.4 Kbps)
- Completely bypass vocoder
- Fix the rate for CDMA networks
- TR45.5 FAX standard for CDMA WLLs

SPRINT PCS, Ted Holdahl

Contribution of live test results. Supports findings of other CDMA tests. If vocoder is not an issue then power is an issue. Sprint is set up for 1% frame errors. Turbo code entry made be in error since turbo code does not send numbers as indicated on test result. Close loop power control will tell the handset to reduce power until it detects an error. Base to handset is an open loop power set. Base is slower to respond than closed link but it still attempts to increase power to improve transmission to set level of error rate.

MOTOROLA, Paul Mollar

Systems tested: NAMPS – 800 Mhz

NADC- 800Mhz

CDMA - 800Mhz

TDMA

GSM

Postulated that error rate is based on type of echo cancellor. As error rate goes up the possibility of a shift error goes up also. Consequence of a shift error is that an entire sentence is lost when a shift error occurs.

- Through Put Testing

- Update Matrix

Based on contributions, Chair of Working Group #1/3 will enter test data into Matrix to provide a summary to be included in TTY-5.

- Review Draft SRD - 2.5mm jack

Ericsson submitted draft with information and findings to formulate an actual SRD. The long-range plan could be to submit for standardization but the process could be 18 months to complete the standards process. Recommendation that the document be established as an agreed to technical document from the TTY Forum to give guidelines to manufacturers. Recommend that this document be reworked by Lee Whritenour and working group then resubmitted as a TTY Forum Technical Information Document. Document will be for information purposes only and is not intended as an exclusive solution or requirement. Group will consist of Lee Whritenour, Paul Mollar, Steve Sendele, and Ron Schultz.

- **REPORT OF WORKING GROUP #2**

Brye Bonner, Motorola, chair,

Air interfaces, inner working function cannot be separated out. For future modems will not be part of the solution. It will require changes to the MSC. This is a data only solution and will not incorporate Baudot. Could be made to support Baudot with V.18. This is for future solution but does not exclude POTS. This will connect from wireless digital through the network then back to the wireline (POTS) at the PSAP. This is not just for 9-1-1. There will be a communications process that could carry data and allow interconnection for data for normal traffic and emergency traffic. This is the same solution that is being proposed for Europe by European Telecommunications Standards Institute (ETSI). This committee could assemble a set of requirements and submit to a standards body. This would allow manufacturers to produce equipment that would have a common interface. The standards are voluntary. Request from the chair that the TTY Forum provide comments in the form of written contributions at the next TTY Forum.

- Presentation – DSPG Ltd., George Kokoski

Involved in satellite telephony, speech compressor for vocoders. They work in a very noisy environment. The old technology does not take advantage of new advances. In

Europe there is a large problem with text telephone because of lack of standards. V.18 is an attempt to standardize the system and allow TTYs to communicate. Extensive testing of Ultratec and many European models. First issue is connectivity – transmit data over various vocoders (except CDMA but that might work as well in voice band data). Connect the mobile phone to the text teletype machine. Using direct coupling, inexpensive interface (5\$) and cable (\$2) – PCMPICIA card. Solution uses adaptive gain controls, which automatically adjusts network gain. Adaptive control is not part of V.18, which is a protocol. V.18 allows the devices to detect what protocol is being used. Most text telephones are two wire which is a disadvantage because they must be adapted to a four wire and there is a problem of echo. There is no volume control required because it is set adaptively. GSM doesn't carry Baudot very well (but does work well with a European alternative protocol). Implementing on two or three different platforms. Products will be available by the end of the year. Concept of new text telephone will be available by the end of the summer. Includes an open port, which will allow additional flexibility in future. Text Telephone digital available for ISDN with available features. Stand-alone system is available currently. V.18 is ideally suited to Relay calls

Tegic

- Communications, Cliff Kushler

T-9 handset is one finger typing on telephone handset. Software determines the likely word, if software is wrong then additional keystrokes will allow typist to scroll through other possibilities. To type numbers press and hold for set time and it will revert from letter to number. With 16 hours of practice, typist could type at 75 words per minute. This technology is just to make the keypad type words. Technology requires 50k and could be integrated into whatever send mode is required.

- Review Draft SRD – V.18

Davis Baquis, SHHH

Voice through is recommended as a replacement to VCO/HCO to avoid confusion with the Relay Services. Include this in the document for consumer features document to allow consideration of the needs of people who want to use their own voice in an emergency call. Beta tests at some PSAPs to try the ability to toggle between voice and TTY. 26-28 million people in the country have hearing loss. Some may buy mobile phones but not be users of TTY. FCC would like estimates of how many

people are using voice through. Will poll at the next convention. What is the definition of VCO/HCO? Relay Services: VCO – consumer has text telephone and receiving end doesn't. This requires a third party to translate conversation and pass it through. HCO – a person who can't speak but can hear and requires an intermediary to translate typed information. It is not simultaneous – one or the other transmits. Current trends could make each handset a text telephone as well. In voice over will there be anything to specify whether the user will be speaking or will be hearing because the device should not be configured to both simultaneously because it will clutter transmission. Comment: There is concern at the FCC and in the industry that the PSAPs are not prepared to receive these voice-through style calls.

Recommendations from group:

Add to goals of interface group to specify connection.

At the next TTY Forum David Baquis will provide the TTY Forum- 6 a written contribution clarification for the group. Also needed is a contribution regarding PSAP's ability to receive calls via voice-through. Have a separate luncheon speaker to clarify issue. And invite Department of Justice to next meeting to discuss access issues. Claude Stout will provide speaker from DOJ

13. DISCUSS AND DEFINE END USER TEST

Toni Dunn, Texas 9-1-1, chair. Presentation by Judy Harkins, Gallaudet University

This is not the best process to arrive at valid results. There should not be a subjective. Manufacturers need to have a benchmark to target. To identify where communication breaks down may not describe the acceptable error rate for consumers in an emergency. The error rate for analog is about 1% or less and that may be the error rate that is acceptable for digital. A working group should be formed and should include consumers, manufacturers, and emergency services. Conditions must be specified because signal strength has to be at a certain level.

Comments:

Even hearing users experience dropped calls and static in the wireless calls.

It is possible to create a box to add conditions to the line. That way the testing can be very precise.

Should the name of the test be changed to End User Validation or Benchmark?

The test should be administered as a benchmark and then as a validation.

It should be administered in a controlled environment.

Recommendation from the chair: Create a study group to be accountable for the completion of the benchmarking and validation of TTY over digital.

Study Group:

Judy Harkins, leader

notify the industry of a complaint within 1 day, the industry must respond with a solution in 5 days. Extensions are available. Process then moves to informal phase at some undefined point. Another defense is the good faith defense i.e. accessible user information, internal checklists, etc. Review full summary for details.

17. NEW BUSINESS/NEXT STEPS

Look at existing TIA standard TIA/EIA 688 for connection to wireless phones. If it does not work for this group then TR30.2 will take on the standardization process.

18. NEXT MEETING

NEXT TTY Forum on: July 21-22

19. ADJOURNMENT

Meeting adjourned.

| | | | | |
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